Remarks/Arguments

Applicants have received and carefully reviewed the Office Action mailed January 5, 2005. Claims 23-75 are pending. Reconsideration and reexamination are respectfully requested.

Allowable Subject Matter

Applicants thank the Examiner for indicating claims 64-67 are allowed.

Rejections under 35 U.S.C. § 103(a)

Claims 23-63 and 68-75 remain rejected as being unpatentable over Hudson et al. (US 5,970,997 and Erdman et al. (US 6,414,408).

In response to Applicants previous arguments, the Examiner asserts that in the device of Hudson et al., the motor causes the transmission to turn bias shaft 20, which winds spring 18, thus storing kinetic energy, and storing kinetic energy will require pushing the spring, or in other words, acting against biasing force. Applicants submit that such teaching or suggestion does not arrive at the method of claim 23, which recites the step of providing power to the drive motor to move the movable member against the biasing force along the range of motion from the first position toward the second position. Thus, in claim 23, the drive motor moves the movable member against the biasing force as it travels from the first to second positions. As the Examiner stated, Hudson et al. disclose moving the bias shaft 20 against the biasing force of the spring. Hudson et al. do not, however, disclose or suggest moving the movable member (valve or damper 32) against a biasing force along the range of motion from a first to a second position, as is recited in claim 23. Hudson et al. thus fail to teach the recited elements of the claims.

In the Hudson et al. device, the motor moves the valve from a first to a second position, while the brake maintains the spring in a wound configuration, without the spring putting any biasing force on the valve as it is moved. Hudson et al. specifically teach that the apparatus "initially winds an internal return spring 54 and then decouples spring 54 from input shaft 24 to drive member 22." See column 7, lines 1-3. Hudson et al. state "in normal operation, drive

motor 12 is free to actuate valve 32 (or damper) <u>without having to wind and unwind spring</u> 54" (emphasis added). See column 7, lines 29-31. Hudson et al. thus clearly disclose that in their device, power is <u>not</u> provided "to the drive motor to move the movable member <u>against the biasing force</u> along the range of motion <u>from the first position toward the second position</u>" as is recited in claim 23. In fact, it appears that Hudson et al. would actually teach away from this step. Thus, there is no motivation for one to modify the device of Hudson et al. to achieve the instantly claimed methods.

The second method step in independent claim 23 is that of determining when the drive motor stalls along the range of motion at a stalled position by monitoring one or more <u>electrical characteristic</u> of the drive motor. There does not appear to be any teaching or contemplation in Hudson et al. for determining that the drive motor has stalled by monitoring one or more electrical characteristic of the motor. The Examiner states that Hudson et al. teaches, at column 13, lines 4-27, that controller 136 determines whether a load and/or spring is connected to the actuator by monitoring the direction of motor rotation and the motor speed in order to detect motor stall. However, Hudson et al. actually teaches, at column 13, lines 4-62:

> In the preferred embodiment of the present invention, controller 136 determines whether a load and/or a spring is connected to the actuator by monitoring the direction of motor rotation and the motor speed in order to detect motor stall. Specifically, when the torque produced by drive motor 112 is insufficient to overcome the resistance of the connected load or spring, the motor will stall indicating that a load is connected to positioning member 134 or that bias member 118 is being wound by rotation of drive motor 112 in the selected direction. The preferred apparatus for detecting stalls in actuator 110 is shown in FIG. 13 to include a magnetic disk 194 with asymmetrical magnetic poles coupled for rotation with the shaft of drive motor 112. As will be appreciated by those skilled in the art, a bipolar hall-effect sensor communicates with magnetic disk 194 in order to generate a pulse train that indicates the direction and presence or absence of rotation of drive motor 112. Those skilled in the art will further appreciate that while the specific stall detection apparatus disclosed and claimed herein provides advantages over prior art techniques, a multitude of alternative stall detection assemblies are known in the art and adaptable for use with actuator apparatus 110 and controller 136. Specifically, it is contemplated that one such alternative includes coupling a magnetic disk having symmetrical poles for rotation with the drive motor shaft and placing two hall-effect sensors in communication therewith.
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> With continued references to FIG. 13, magnetic disk 194 is coupled for rotation with the drive motor shaft so as to trigger the bi-polar hall-effect sensor such that the sensor turns on (logic level "zero") in the presence of a magnetic south pole and turns off (logic level "one") when in the presence of a magnetic north pole. As will be appreciated by those skilled in the art, rotation of the drive motor shaft causes the hall-effect sensor to generate a pulse train that is based upon the orientation of the asymmetrical poles and unique to the direction of rotation of magnetic disk 194. Controller 136 is coupled for communication with the hall-effect sensor whereby the controller

> receives the pulse train from which the direction of drive motor rotation and the presence or absence of motor stall are identified.
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> The asymmetrical poles of magnetic disk 194 are preferably arranged such that a first north pole 196 is positioned opposite a second south pole 202, a second north pole 200 bisects the angular distance between first north pole 196 and second south pole 202, and a first south pole 198 bisects the angular distance between first and second north poles 196 and 200, respectively. When magnetic disk 194 rotates in a counter clockwise direction as indicated by arrow 204, this -o asymmetrical pole configuration generates a first pulse train 206 illustrated in FIG. 14. Similarly, a second pulse train 208 is communicated to controller 136 when disk 194 rotates in a clockwise direction. In the preferred embodiment, a full rotation of a magnetic disk 194 includes forty-eight stroke steps including six steps between first north pole 196 and first south pole 198, six steps between first south pole 198 and second north pole 200, twelve steps between second north pole 200 and second south pole 202, and twenty-four steps between second south pole 202 and first north pole 196.

The passage of Hudson et al. cited by the Examiner appears to have been taken a bit out of context. When the full passage quoted above is read in its entirety, one can see that Hudson et al. actually teaches that the controller uses <u>Hall sensors</u> to detect direction of rotation and motor speed, not electrical characteristics of the <u>motor</u>. Hudson et al. thus does not teach or suggest the claimed method step of determined when a drive motor stalls by monitoring one or more <u>electrical characteristics</u> of the drive motor.

The Examiner acknowledges that Hudson et al. fails to teach reducing the power applied to the drive motor to maintain the movable member at a substantially stalled position <u>against a bias force</u> when it is determined the motor has stalled. The Examiner asserts, however, that Erdman generically teaches a bridge power supply, in which the motor is protected under stall conditions by a current limiting circuit and timed retry circuit, and "fan load" motor control that is asserted to be applicable to other motor control designs. However, the Examiner does not provide reasoning as to why one of ordinary skill in the art would have been motivated to modify the device of Hudson et al. according to Erdman. As stated in the previous response, the only motivation for making such a combination appears to be found in Applicants' own specification, which is improper.

Even if one were to combine the teachings of Hudson et al. and Erdman, one would not arrive at the instant invention because neither Hudson et al. nor Erdman teach or suggest the step of reducing the power applied to the drive motor to maintain the movable member at a

substantially stalled position against a bias force when it is determined the motor has stalled, as is recited in claim 23. There does not appear to be a bias force in the fan motor system of Erdman, thus Erdman cannot be seen to provide motivation for modifying Hudson et al. to reduce power to maintain a movable member at a substantially stalled position against a bias force.

Furthermore, Erdman discloses a system in which, under a stall condition, protective circuitry will shut off current flow to the motor to prevent demagnetizing of the motor rotor magnets. Erdman teaches a periodic retry cycle that shuts off the motor and attempts motor restart every 1.38 seconds. See column 16, lines 43-46 and column 22, lines 14-39. Erdman thus cannot be seen to provide motivation for reducing power supplied to a motor to a level adapted to maintain a movable member at substantially a stalled position.

In addition, and as stated above, Erdman et al. is directed to a system of powering a fan using a motor. The fan moves in one direction continuously, thus there does not appear to be any need for a bias force against which the fan is moved by the motor. Erdman et al. does not appear to teach or contemplate a structure or method step of reducing power to the motor to maintain a movable member at a stalled position. Thus, neither Hudson et al. nor Erdman et al. teaches or suggests the claimed element.

The Hudson et al. disclosure is directed to a system for controlling a movable member such as a valve or damper that moves back and forth from a first position to a second position. Erdman et al., however, is directed to a system for controlling a fan that turns continuously, and thus clearly has no bias force. The structure and method of operation of the two systems are completely different.

Furthermore, both Hudson et al. (column 13, lines 30-43) and Erdman et al. (column 4, lines 45-49) each appear to teach providing separate sensors to detect motor stall. Thus there would be no motivation to combine the teachings of Erdman et al. and Hudson et al. to include a mechanism for determining when the drive motor of Hudson et al. stalls by monitoring one or more electrical characteristics of the drive motor, as the Examiner suggests. Hudson et al. already provide a mechanism for detecting motor stall, which includes providing stall detect

sensors (e.g. Hall sensors). Thus, the proposed modification to Hudson et al. would merely result in a redundant stall detection system. In addition, Applicants submit that one of ordinary skill in the art would not be motivated to look to a fan motor system such as that taught in Erdman et al. to modify a valve or damper motor system as in Hudson et al. It appears that the only motivation for such a combination is in Applicants' own specification.

Regarding the elements of independent claims 42, 58, 61, 72, or 74, the Examiner asserts that the presence of excessive torque will call for excessive or overload currents that can be prevented by applying reduced power to the motor as in the combination of above teachings. However, the Examiner has not indicated where in either Hudson et al. or Erdman such a teaching or suggestion can be found, and had not provided any reasoning as to why one would modify the device of Hudson et al. to achieve the claimed invention.

Independent claim 42 recites the method step of providing power to the drive motor to move the damper to the open position wherein the power provided to the motor is below a level where the motor would produce a torque that causes damage to the drive motor, the gear assembly, and the damper when the motor normally stalls at the open position. In the method of claim 42, it is the power that is applied to drive the damper to the open position that is kept below a level that would produce a torque to cause damage. In Erdman et al., the protective start retry circuit appears to <u>stop</u> the motor <u>after</u> a stall or when a normal running speed is not achieved in a predetermined time. See column 22, lines 25-30. Erdman says nothing about the power level that is applied before a stall occurs. In addition, Erdman appears to be concerned with preventing <u>demagnetizing</u> of the motor rotor magnets after a stall occurs, and not preventing damage to the drive motor, gear assembly, and damper, as is recited in the claim.

Applicants submit that Hudson et al. and Erdman et al., either alone or in combination, fail to teach or suggest all of the limitations in claims 23-63 and 68-75. For the foregoing reasons, as well as other reasons, withdrawal of the rejection is respectfully requested.

Reconsideration and reexamination are respectfully requested. It is submitted that, in light of the above remarks, all pending claims 23-75 are now in condition for allowance. If a telephone interview would be of assistance, please contact the undersigned attorney at 612-677-9050.

Respectfully Submitted:

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